12598 - HST Observations of Astrophysically Important Visual Binaries: Calibrating Sirius and Procyon

Cycle: 19, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

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VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) HD23886	WFC3/UVIS	1	11-Jul-2011 22:40:20.0	yes

1 Total Orbits Used

ABSTRACT

We have an ongoing long-term program, renewed in Cycle 18 for 3 years, in which we are imaging several important visual binaries, including Sirius and Procyon. The aims of this astrometric program are to determine precise dynamical masses for the white-dwarf and main-sequence components of

the binaries, and to search for (or set limits on) third bodies in the systems down to planetary masses.

With the advent of WFC3 in our program, we are forced to saturate the images of Sirius A and Procyon A, and instead use the diffraction spikes to infer their centroid locations. In order to calibrate the use of the spikes against the conventional method of centroiding an unsaturated image, which is the method used for the much fainter white-dwarf companions, we request one orbit for imaging of a fainter A-type star. For this star it is possible to obtain both unsaturated images for conventional centroiding and deeper saturated images to which we can apply our diffraction-spike algorithm and derive the offsets. We can thus apply corrections to our diffraction-spike-based astrometry of the saturated Sirius A and Procyon A images, reducing the systematic errors to below 1 mas, and setting tight limits on third bodies.

We will not request any additional funding if this supplemental request is approved, and we will waive the proprietary period.

OBSERVING DESCRIPTION

These observations of an 8th-magnitude A5 V star are being made in order to calibrate the method of using diffraction spikes to centroid images of bright, overexposed stars in WFC3/UVIS images. We have a separate program of imaging of the bright stars Sirius and Procyon with the F953N filter. These images are necessarily overexposed because there is no way to take unsaturated WFC3 images of these very bright stars.

To determine whether there are systematic offsets from the true centroids and centroids determined from the diffraction spikes, we will observe the 8th-magnitude star with the same filter and UVIS aperture used for Sirius and Procyon, and will combine unsaturated 5-sec exposures with saturated ~600 sec exposures. We will use the same 4-point dither pattern being used for the two bright stars.

Visit

Proposal 12598, Visit 01 Tue Jul 12 02:40:26 GMT 2011

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: PCS MODE FINE; SCHED 30%

Patterns

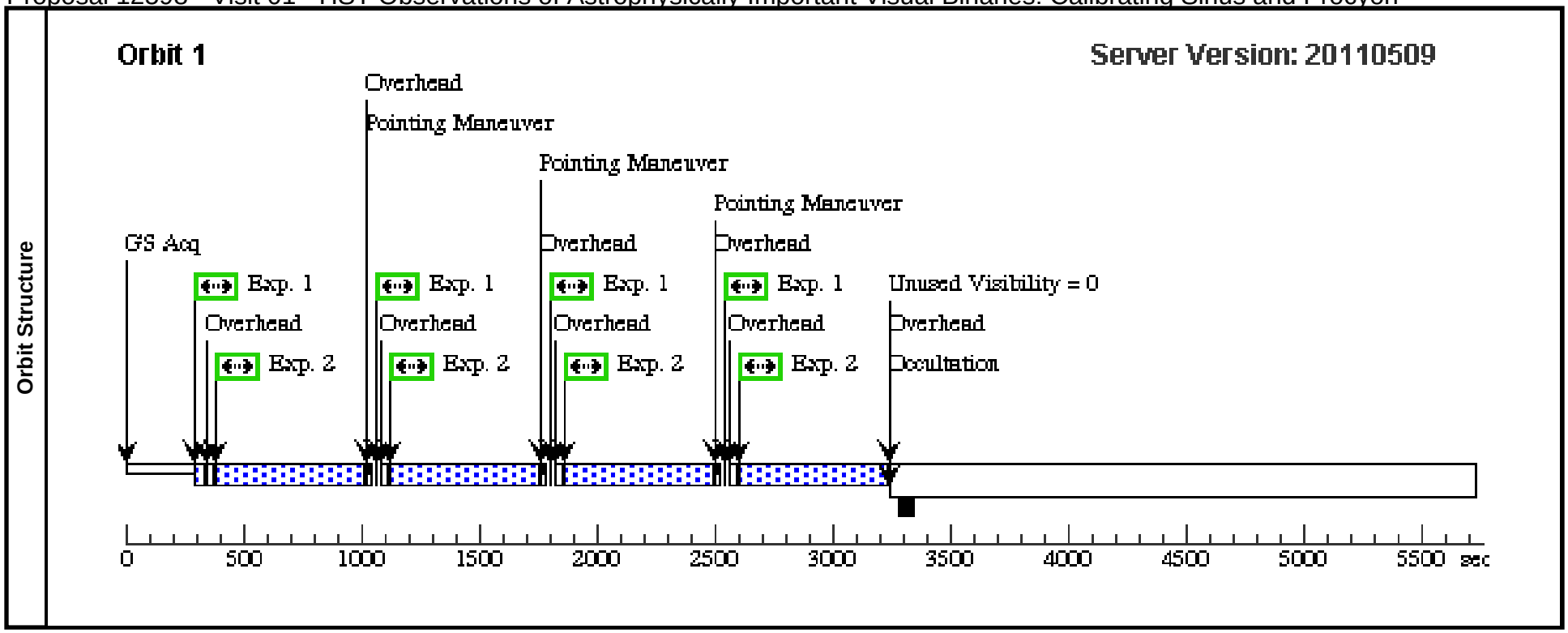
#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFC3-UVIS-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.173 Line Spacing=0.112	Coordinate Frame=POS-TARG Pattern Orientation=23.884 Angle Between Sides=81.785 Center Pattern=true		(1-2)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	HD23886	RA: 03 49 25.9833 (57.3582638d) Dec: +24 14 51.74 (24.24771d) Equinox: J2000	Proper Motion RA: .0211 arcsec/yr Proper Motion Dec: -.0425 arcsec/yr Epoch of Position: 2000.	V=8.01+/-0.02 A5 V	Reference Frame: ICRS

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1	(WFC3UVIS.im.199184)	(1) HD23886	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F953N	CR-SPLIT=NO		Pattern 1, Exps 1-2 in Visit 01 (1)	5 Secs *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
2		(1) HD23886	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F953N	CR-SPLIT=NO		Pattern 1, Exps 1-2 in Visit 01 (1)	500 Secs *[==>631.0 Secs (Pattern 1)]* *[==>631.0 Secs (Pattern 2)]* *[==>631.0 Secs (Pattern 3)]* *[==>631.0 Secs (Pattern 4)]*	***[1]***


Orbit Structure
Orbit 1
Server Version: 20110509
Overhead
Pointing Maneuver
Pointing Maneuver
Pointing Maneuver
GS Acq
Exp. 1
Overhead
Exp. 2
Exp. 1
Overhead
Exp. 2
Overhead
Exp. 1
Overhead
Exp. 2
Overhead
Exp. 1
Overhead
Exp. 2
Unused Visibility = 0
Overhead
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec